Total No. of Questions : **08** Roll No. : 0701.....

B.Tech EIGHTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-8311 (EL-I) HIGH VOLTAGE ENGINEERING

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Sketch and explain the typical current voltage characteristics of the discharge between two electrodes in the gas. ***06***

(b) Explain the mechanism of development of anode and cathode streamer and explain how these lead to breakdown. ***08***

2(a) State various processes which lead to formation of bubbles in liquid dielectrics and explain clearly cavity break down mechanism in liquid electrics. ***07***

(b) Outline the sequence of processes leading to corona inception and breakdown on transmission lines. ***04***

(c) How do intrinsic breakdown and electromechanical breakdown differ in solid dielectrics? ***03***

3(a) (i) Why impulse testing is necessary for transformers and it is not necessary for alternators. ***04***
(ii) What parameters define a standard impulse voltage wave? ***03***

(b) Explain operation of Cockroff Waltan voltage multiplier circuit when the circuit is : ***07***
(i) unloaded (ii) Loaded.

4(a) Explain with neat diagram the basic principle of reactive power compensation in high voltage a.c. testing of insulating materials. ***05***

(b) Discuss the error sources in high voltage measurement systems. ***05***

(c) What are the requirements of a sphere gap for measurement of high voltages? ***04***

5(a) Explain how insulation resistance tests help in identifying weak spots in cable systems. ***04***

(b) What are the standards followed in high voltage equipment testing? ***03***

(c) Explain briefly various tests to be carried out on a bushing. ***07***

6(a) What are partial discharges? Differentiate between internal and external discharges. ***07***

(b) What are the causes of switching surges? With the help of sketches explain the wave shapes, order of magnitude and duration of these over voltages. ***07***

7(a) Describe how travelling waves propagate through transmission lines. ***07***

(b) What is back flash-over on transmission lines? How is it affected by tower footing resistance? ***04***

(c) Why it is advisable to switch in extra transmission lines during thunder storm? ***03***

8(a) (i) Explain the voltage profile of loaded and unloaded EHV line along the line length. ***07***
(ii) What is surge impendence loading?

(b) Define the flexible AC transmission system. Explain how the various types of limits can be improved by using them? ***07***

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech EIGHTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-8321 (EL-II) UTILIZATION OF ELECTRICAL POWER

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Describe with a neat sketch the working of arc lamps. Explain how the lamp distributes and controls the light it produces for specific applications. ***07***

(b) A filament lamp is 500 W is suspended at a height of 5 m above working plane and gives uniform illumination over an area of 8 m diameter. Assume efficiency of reflector is 60%. Determine the illumination on the working plane. Efficiency of lamp is 0.9 watt per candle power. ***07***

2(a) Explain with a neat diagram the principle of operation of a LED lamp. Enumerate its advantages and disadvantages. ***07***

(b) Explain the operation of direct resistance heating and indirect resistance heating with neat diagrams. What properties must the heating element possess? ***07***

3(a) What is the fundamental difference between electric arc and resistance welding? What are the basic components of resistance welding sets and explain their working? ***07***

(b) What is dielectric heating? What are the factors which decide the frequency and voltage of the dielectric heating? Explain. ***07***

4(a) Explain the electrical characteristics that traction motors should possess. Discuss the merits of electric traction systems over other traction systems. ***07***

(b) A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. If the maximum speed is to be limited to 64 kmph, acceleration to 2.0 kmphs and coasting and braking retardation to 0.16 kmphs and 3.2 kmphs respectively, determine the duration of acceleration, coasting and breaking periods. Assume any type of simplified speed-time curve. ***07***

5(a) What is a speed - time curve? Discuss briefly the distinct periods in a typical speed-time curve of a train running on main line. ***07***

(b) An electric train weighting 200 tonne has eight motors geared to driving wheel; each wheel is 90 cm diameter. Determine the required tractive effort by all motors to accelerate the train to a speed of 48 kmph in 30 seconds up a gradient of 1 in 200. The tractive resistance is of 50 newtons per tonne, the effect of rotational inertia is 10 % of the train weight, the gear ratio is 4 to 1 and gearing efficiency is 80 %. ***07***

6(a) Describe starting methods of various types of traction motors with justification. ***07***

(b) State the major components of a single-phase traction system accompanied by a neat diagram and explain the function of each component. ***07***

7(a) What are the various methods of electric braking? Explain these methods with circuit diagrams. ***07***

(b) What is load equalization? Derive the expression for instantaneous motor torque and moment of inertia of the flywheel. ***07***

8 Write short notes on **any two**: ***14***

(i) Inverse square and cosine laws (ii) Arc furnaces
(iii) Speed control of traction motors (iv) Specific energy consumption.

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech EIGHTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-8322 (EL-II) COMPUTER AIDED POWER SYSTEM

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Discuss the algorithm for formation of Y-bus matrix. ***07***

(b) Discuss the capability curves of alternator. What factor limits the reactive power generation of an alternator? ***07***

2(a) What do you mean by power transfer capability of transmission line? Discuss the effect of static VAr compensation on power transfer capability of a line. ***07***

(b) Explain P-V curves when a synchronous generator transfers power to a asynchronous load through a transmission line. What is the significance of P-V curves in power system? ***07***

3(a) What do you understand by line outage ranking? Discuss in brief. ***07***

(b) Explain sensitivity analysis in power systems. Discuss the application of SA in identifying weak PQ buses in power systems. ***07***

4(a) What do you understand by power system security? What factors are to be considered for a secure operation of power system? ***07***

(b) Discuss various contingencies in power systems. How contingency analysis is performed? ***07***

5(a) What do you mean by voltage stability in power systems? How it differs from rotor angle stability? ***07***

(b) Discuss various techniques of voltage stability enhancement. ***07***

6(a) Discuss the properties of Z-bus matrix. How it is helpful in power system analysis? ***07***

(b) What do you understand by current chopping? How resistance switching can be used to limit it? ***07***

7(a) Discuss advantages of CPF algorithm. How it can be used to asses exact distance to collapse? ***07***

(b) What do you understand by economic load dispatch? Discuss the case when line losses are being considered. ***07***

8 Write short notes on **any two** : ***7*2***

(i) Comparison between series and shunt compensation
(ii) Line outage Ranking
(iii) Proximity and Mechanism

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech EIGHTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-8333 (EL-III) WIND & SOLAR ENERGY SYSTEM

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Why are renewable energy sources considered environmentally friendly?

(b) Explain the single crystal silicon cell draw its cross-sectional diagram.

2(a) What is the speed ratio that allows maximum power extraction from the wind? Show that the maximum power extraction from the wind is given as :

$$P_{max} = \frac{1}{2} * \rho * A * V^3 * 0.59$$

(b) What are the key factors to consider when selecting a site for a wind power plant?

3(a) How does aerodynamic power control help in optimizing wind turbine performance? Explain the pitch control technique in wind turbines?

(b) Find the electric power output of a three-bladed propeller-type wind machine operating at a constant rotor speed of 12 rpm. The cut-in speed, design speed and cut-out speed of the machine are 5, 12 and 80 kmph respectively. The mechanical efficiency of the machine is 90% and generator efficiency is 93%. The machine is installed at a height of 60 km from the ground and the diameter of its rotor is 60 m. Assume $\varepsilon = 0.011$ and $\rho = 1.2 kg/m^3$.

4(a) Describe the operation of a self-excited induction generator and illustrate its magnetizing curve.

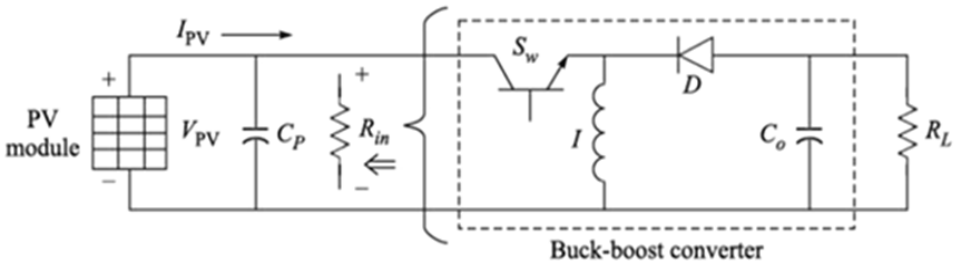
(b) How does power electronics play a role in the Danish concept for induction generator in wind turbine?

5(a) Describe the working principle of a solar cell with suitable diagram.

(b) How does the current output of a PV panel change when 'n' photovoltaic cells are connected in series, assuming all cells are identical? Also draw its equivalent circuit.

6(a) The relationship between the output voltage and current for a PV array is defined by the data given in the table. The PV array is connected to a resistive load RL of 30 Ω through a buck-boost type second-order converter, operating in a continuous conduction mode. Determine the duty cycle of the interfacing converter required to operate PV array at the voltage of 28.08 V.

V_{PV} (Volts)	27.86	27.91	27.97	28.02	28.08	28.13	28.18	28.24	28.29	28.35
I_{PV} (Amps)	1.76	1.73	1.71	1.69	1.67	1.64	1.62	1.59	1.57	1.54



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6(b) What are the different types of batteries commonly used for energy storage in solar energy systems? Explain lead-acid battery in details.

7(a) Explain the various types of hybrid PV system. Describe the PV-wind hybrid system in details.

(b) Draw the block diagram of series and shunt type charge controller. How can a DC to DC converter be used in a charge controller?

8 Write short notes on **any two**:

(i) Wind speed-power curve
(ii) Synchronous generator
(iii) MPPT techniques

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